

Appln. No. 10/621,810
Amendment dated August 20, 2004
Reply to Office Action of February 20, 2004

REMARKS/ARGUMENTS

Reconsideration of the above-identified application respectfully requested.

With the present amendment and response, claims 1 and 24 have been cancelled and replaced with new claims 45 and 46, respectively. Claims 2-8 and 12 have been amended to depend from new independent claim 45. Claims 25-29 and 33 have been amended to depend from new independent claim 46.

The Examiner's proposed amendment to claim 33 has been implemented. For clarification, the word "carrier" has been inserted before the word "having" in line 2. To provide proper antecedent basis in view of the clarification, the word "said" replaces "a" before the word "carrier" in line 3. No new matter is added by virtue of these claim amendments. Moreover, such claim amendments relate to clarification of the claim as originally submitted. Accordingly, Applicants assert that the claims have not been narrowed with the meaning of *Festo (Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 US 722, 112 S.Ct. 1831, 152 L.Ed.2d 944, 62 USPQ2d 1705 (2002))*. See also *Interactive Pictures Corp. v. Infinite Pictures Inc., 274 F.3d 1371, 61 USPQ 1152 (Fed. Cir. 2001)* (addition of the words "transform calculation" was not a narrowing amendment because that addition did nothing more than make express what had been implicit in the claim as originally worded).

The present invention is addressed to an improved apparatus and method for creating graphics displays. A unique method for creating graphics displays is disclosed in U.S. Patent No. 5,613,022, by Odhner, *et al.*, entitled "Diffraction Display and Method Utilizing Reflective or Transmissive Light Yielding Single Pixel Full Color Capability," issued March 18, 1997 (hereinafter referred to as "the '022 patent"). Using this technique, a diffraction grating, carried by an electroactive or magnetoactive film, is connected to an energy source that is energizable for movement of the film. The diffraction grating will diffract a particular color when illuminated by a broadband source at a particular angle. Movement of the film carrying the diffraction pattern will change the angle of incident light to the diffraction grating. This will cause the beam diffracted at a given angle to change its wavelength. For a broadband visible light source, it is possible to cause a pixel to reflect the colors, *inter alia*, red, green, and blue, as a function of the rotation of the diffraction grating. A matrix of these pixels results in a full color display. Moreover, each such pixel is separately addressable so that the matrix of such pixels is able to generate graphic displays that can be static or dynamic.

The embodiments disclosed in the '022 patent may be produced satisfactorily for most commercial purposes; however, in testing an embodiment using a fixed coil and a moving magnetic component to which the holographic diffraction grating is attached, unexpected results were achieved. It was expected that providing a fixed coil and moving magnet, instead of a

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fixed magnet and moving coil, would result in equivalent performance. The inventors discovered that such is not the case. The moving magnet approach provides unexpected and beneficial results including smaller mass relative to torque produced and less power dissipation, less hinge material variance in spring constant and conductivity, fewer production quality control issues, and lower production process costs. Application at page 5, lines 3-11.

Although the present invention presents a novel approach to moving the holographic diffraction grating, the concepts for creating or forming a diffractive display are the same as those disclosed in the '022 patent. See, for example, Figs. 7-12 and the accompanying description, which describe how a display can be readily manufactured for implementing the diffractive approach. The same definitions and descriptions apply to elements which appear in both the '022 patent and the present application, as the '022 patent was incorporated by reference in the present application. Application, page 12, lines 31-33.

It is noted that claims 1-3, 8, 10, 24-25, 29, and 31 stand rejected under 35 U.S.C. § 102 as being anticipated by PCT published application WO 91/02991, which is hereinafter referred to as Welbourn.

Welbourn is non-analogous art and, therefore, inapplicable to the present invention. Even if it were analogous art, Welbourn does not disclose all of the elements of newly added claims 45 and 46. In particular, Welbourn does not disclose "a broadband source", "an eye station", or the rotation of a holographic pattern "to generate any select diffracted energy from said holographic pattern at said eye station for forming a display."

First, Welbourn is non-analogous art. Unlike the present invention, which is addressed to a diffractive display, Welbourn is in an entirely different field, relating to applications where tunable optical filters or beam deflection are required. Such applications include, for example, long external cavity lasers, wave division multiplexers, and wavelength selectors for lasers and optical switches. Welbourn, page 1, lines 4-9. For example, Welbourn describes the use of their device in the context of an LEC laser. In the a typical laser, light bounces back and forth between reflecting walls, the output of the laser being a balance between the percentage of light which leaks out through one of the reflecting walls and the number of times the light beam is reflected. Welbourn, page 4, lines 15-21. To achieve widely spaced modes, each having a narrow linewidth, an external cavity may be provided to form a long external cavity (LEC) laser. Welbourn, page 4, lines 24-32. One of the reflecting walls is coated with an anti-reflection coating so that light striking that wall passes through. Welbourn, page 4, lines 32-35. A mirror is placed a predetermined distance away to form the other wall of the external cavity. Welbourn, page 5, line 1. The problem with using a mirror is that the accuracy with which the mirror must be placed cannot, in practice, be achieved. Welbourn, page 5, lines 4-6. To overcome this

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problem, the mirror can be replaced with an adjustable diffraction grating suitable angled to diffract light back to the laser. Welbourn, page 5, lines 7-9. Welbourn provides an improved reflecting surface.

As noted above, Welbourn's device is in an art field entirely unrelated to that of the present invention. Welbourn is a light positioning or aligning apparatus for use in telecommunications applications. The problem solved by the Welbourn device is entirely different from that solved by the present invention. In Welbourn, the adjustment of the diffraction grating is an initialization step, *i.e.*, a set-up procedure. Once the diffraction grating has been accurately angled to diffract light back to the laser from the external cavity, the diffraction grating remains stationary. By changing the angle of the diffraction grating, the laser will oscillate at a different frequency. Again, though, once the frequency is selected, the laser will continuously oscillate at the selected frequency during use because the diffraction grating remains stationary.

On the other hand, the present invention is in the field of displays for generating graphics and alphanumeric characters and addresses the problem of improving the performance of the diffractive display disclosed in the above-described '022 patent. This is a dynamic system, the holographic diffraction grating of each pixel being rotated continuously during operation of the display. Each pixel's holographic pattern of a diffraction grating diffracts a broadband source into its constituent energies. The movement of the holographic pattern sequentially displays those diffracted energies to an observer. In this way, each pixel exhibits a full range of colors. A matrix of these pixels forms the display.

Other differences between the present invention and Welbourn include the type and number of diffraction gratings used. Welbourn requires only one, adjustable etched diffraction grating. Advantageously, the principal structure of Welbourn's apparatus is formed from a single silicon substrate, the components, namely, the cavity, diffraction grating, and torsion bars, being formed in the substrate by etching. In use, Welbourn teaches the use of only one diffraction grating assembly. That diffraction grating assembly, for example, directs light within the external cavity and determines the frequency at which the laser will resonate.

For the present invention, the inventor's problem was how to make the '022 patent's device operate more efficiently at lower cost and ease of production. For this application, the problem is not simply movement of a single diffraction grating. A display includes a plurality of pixels, each pixel utilizing a separate movable holographic pattern of a diffraction grating. In order to be able to make the display efficient, each pixel's holographic pattern must be moved quickly and accurately. Also, size of the pixel elements is paramount, as one of the primary concerns of display construction is pixel density. The smaller the individual elements, the greater

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the number of pixels in a given area. Weight also is an important issue to be considered when designing a display.

When the inventor's developed and tested the moving magnet embodiment disclosed in the present application, they discovered benefits over the moving coil embodiments that were both surprising and unexpected. With the moving magnet approach, each pixel has a smaller mass relative to torque produced and less power dissipation. The moving magnet approach also experiences less hinge material variance in spring constant and conductivity, fewer production quality control issues, and lower production process costs. Application at page 5, lines 3-11. Thus, by using this approach, the present inventive display is more efficient and robust and is easier and cheaper to manufacture. Only by doing a side-by-side comparison are these advantages apparent. Welbourn neither acknowledges nor teaches the use the moving magnet configuration for this purpose to achieve these advantages. In any other field, including Welbourn's, it is unknown whether the moving magnet or moving coil embodiment would be the superior design. The inventors determined that, in the display context, the moving magnet is the superior configuration.

Even assuming, *arguendo*, that Welbourn were analogous art, which it is not, Welbourn does not disclose all of the elements of new independent claims 45 and 46. For example, claim 45 includes "a broadband source" and "an eye station". A broadband source has a plurality of constituent energies enabling each pixel to exhibit a corresponding number of colors. As a display, the eye station provides a location at which the colors are displayed to an observer. These elements are neither disclosed nor taught by Welbourn.

Welbourn also does not teach the rotation of a "holographic pattern" "to generate any select diffracted energy from said holographic pattern at said eye station for forming a display." As noted above, Welbourn teaches an etched diffraction grating. This form is advantageous to Welbourn because Welbourn's device is formed from a single silicone substrate that, by various etching processes, is molded into the final diffraction grating apparatus. In this manner, the diffraction grating is integrally formed with the torsion bars used to change the diffraction grating's angular position. The present invention, by contrast, implements a holographic pattern of a diffraction grating. In a display context, weight is a concern. Where a display may contain hundreds and thousands of pixels, using a holographic diffraction grating provides beneficial weight reduction. They are also easier to manufacture than a traditional ruled or etched grating.

As noted above in detail, Welbourn also does not disclose or teach the rotation of a diffraction grating for forming a display. Welbourn teaches on the use of a moving diffraction grating in telecommunications applications, i.e., to provide an adjustable or tunable laser. As used in the present application, a display includes a matrix of pixels each capable of exhibiting a

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full range of colors. Application, page 1, lines 7-9. Moreover, each such pixel is separately addressable so that the matrix of such pixels is able to generate graphic displays that can be static or dynamic. The '022 patent, Col. 4, lines 4-7. A method for manufacturing such a display is described in connection with Figs. 7-12 of the '022 patent. Such a display is neither taught nor suggested by Welbourn.

It is further noted that claims 5-6, 9, 11, 26-27, 30, and 32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Welbourn.

For the reasons given above, Welbourn does not disclose or teach the recited features of claims 45 and 46. These reasons are equally applicable to claims 5-6, 9, and 11, which depend from new claim 45, and to claims 26-27, 30, and 32, which depend from new claim 46. In view of the fact that Welbourn's device is for telecommunications applications, it would not be obvious to the skilled artisan to modify Welbourn to achieve the claimed invention for forming a display.

Applicants note that the Examiner has objected to claims 4, 7, 12, 28, and 33 as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form, and if claim 33 is rewritten to overcome the Examiner's additional objections.

With respect to claim 33, applicants' have amended that claim to incorporate the Examiner's recommended changes. In view of the arguments presented above, applicants respectfully submit that the new independent claims 45 and 46 should be deemed allowable, obviating the need to rewrite claims 4, 7, 12, 28, and 33 in independent form. In the event that the Examiner's rejection of independent claims 1 and 24 is not ultimately withdrawn, applicants will rewrite these dependent claims in independent form.

Respectfully submitted,

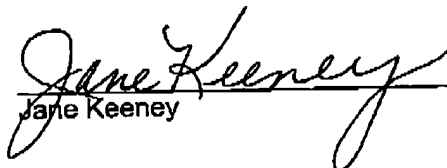
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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being sent to the Honorable Commissioner for Patents via facsimile to number 703-872-9306 on August 20, 2004.


Jane Keeney